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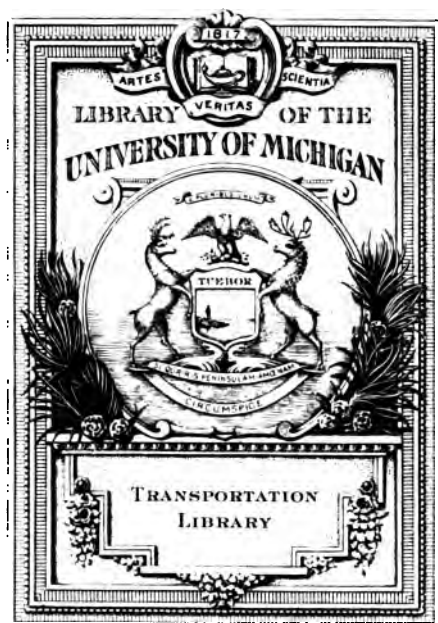
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of the mail coach roads.

## GENERAL RULES

FOR

# REPAIRING ROADS,

PUBLISHED, BY ORDER OF

THE PARLIAMENTARY COMMISSIONERS,

FOR THE

IMPROVEMENT OF THE MAIL COACH ROADS FROM  
LONDON TO HOLYHEAD, AND FROM  
LONDON TO LIVERPOOL,

FOR THE USE OF

THE SURVEYORS ON THESE ROADS.

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*ILLUSTRATED WITH PLATES.*

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A NEW EDITION, ENLARGED.

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## GENERAL RULES

### FOR

# REPAIRING ROADS.

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### SHAPE OR CROSS SECTION.

THE breadth of a road should be 30 feet; the side channels should be 9 inches below the surface in the middle of it. The best line for the cross section, is a segment of a flat ellipsis: this shape assists the water to pass from the centre towards the sides, without making the middle of the road too round, and greatly contributes to the drying of the road, by allowing the action of the sun and air to produce a great degree of evaporation. Surveyors ought always to use a level (see Plate I.) in giving a road a proper shape, in order that the surface may be of one uniform curvature from side to side, without the smallest deviation, in any one spot, from the prescribed line of the cross section. (See Plate II. fig. 1.) Where such uniformity of curvature is wanting in a road, it shows immediately a want of skill and of good workmanship on the part of those who have the management of it.

## DRAINAGE.

All ditches ought to be on the field side of the road fences, and to be connected with the natural water-courses of the country. Stone drains, and culverts, under the road, should be made in sufficient numbers to prevent any water lying on or near the road, and should be continued under the fences into the ditches.

In order to keep a road perfectly dry, openings of mason-work should be made from the side channels of the road, into these cross-drains, to carry off the water from the surface of it. The bottoms of the cross-drains should be well paved, particularly at the openings.

It ought never to be forgotten, that in order to have the surface of a road perfect, it must be kept completely dry.

All land springs ought to be carried from the site of the road by under-draining.

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## TREES AND FENCES.

It is absolutely necessary to remove trees from the sides of roads, and to keep the fences under 5 feet in height. Not less than 25 per cent of the expense of repairing roads is incurred by the trees, and the improper state of the fences, keeping the roads wet, and by that means occasioning the rapid destruction of the materials.

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## MATERIALS.

Where the materials are quarry or field stones, the hardest part of them only should be used. Each stone

should be so broken that it may, in its largest dimensions, pass through a ring of  $2\frac{1}{2}$  inches in diameter. Hammers with slender handles, light, and well steeled, must be made on purpose for breaking them. This work ought always to be done by measure, either at the quarries, or in proper dépôts, made for the purpose on the sides of the road.

Where the materials consist of gravel, the stones only, which exceed  $1\frac{1}{2}$  inch in size, should be taken from the pits for the use of the middle part of the road. These ought to be raked together, as the gravel is thrown up by the workmen. This process will, in most cases, save expense in riddling and washing the gravel. All the smaller stones and gravel may be used for the sides of the road, and the footpaths. Every large gravel stone, exceeding 2 inches in diameter, ought to be broken. Surveyors should pay very particular attention to this plan of managing gravel materials. Where it has been adopted, it has produced very hard roads. The great inferiority of the roads near London is wholly owing to persevering in laying small dirty gravel in the middle of them.

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## DISPOSITION OF MATERIALS.

1. Where a road has not a solid and dry foundation, it should be constructed anew. Upon the bottom of it, a pavement should be made 7 inches deep in the middle and 3 inches at the ends. Soft stones will answer. This pavement should be carefully set by hand, with the broadest end of the stones down; the cavities should be filled with stone chips, to make all level and firm, and no stone should be more than 5 inches broad on its face. Over the 18 centre feet

of this pavement, 6 inches of stones, or of pebbles of the hardest quality, broken of a size that will, in their largest dimensions, pass through a ring of  $2\frac{1}{2}$  inches diameter, should be laid. The 6 feet of the road, on each side of the 18 centre feet (making in all 30 feet), may be made with good clean gravel, or small stones: there should be laid over the whole a coating of small gravel, 1 inch in thickness. (See Plate II. fig. 1.)

2. Where a road has some foundation, but an imperfect one, all the large stones appearing on the surface of it, should be raised and broken; the 18 centre feet of it should then be covered with a coating of broken stones, sufficient to give it a proper cross-sectional shape, and to make it solid and hard. A road should have a body of 14 inches in thickness, of strong materials in the middle, and of 5 inches in thickness at the outside edge.

3. Where a road already has a good foundation, and also a good shape, materials should be constantly laid upon it, for the purpose of filling ruts and hollow places, in thin layers, as soon as they appear. No layers or beds of stone should ever be laid on, except in wet weather, between the 1st of November and the 1st of March. In this way a road, when once well made, may be preserved in constant repair at a small expense.

4. Where the stoned or gravelled part of a road, over which the carriages commonly pass, is less than 30 feet, it should be widened with layers of broken stones, 6 inches in thickness, to that breadth; first digging away the earth, and forming a bottom for them with pavement or rubble-stones.

## LEVELLING WASTES AND FORMING FOOTPATHS.

Where the breadth of the road is already defined to a breadth of 30 feet, by side channels, but only by borders of earth, a row of fresh sods should be laid in the face of these earth borders. Each sod should be laid on its edge, and with a slight inclination. This sod border should be exactly 9 inches high above the bottom of the side channel, and 12 inches wide, so as to form a body of mould for the grass to grow in.

The space between the sod border and the fence of the road should be made quite smooth,—either flat, or with a moderate and uniform inclination, according to the general shape of the ground. Where this space is now very uneven, the whole should be dug over and smoothened. Hay-seeds should be sown on it; and any mischief that may afterwards be done by cattle, should be constantly repaired by new smoothening the surface. (See Plate II. figs. 3 and 5.)

Where the soil is clay between the sod border and the fence, the road scrapings should be spread smoothly over it, and in small quantities at a time, so as to harden the surface, and at the same time not to kill the grass.

Where the road is not yet defined, side channels should be made 30 feet asunder, and borders of sods should be laid, as before described. The earth taken up in forming the side channel, should be laid behind the sod border. The road scrapings should be constantly laid behind this border, till a flat mound is established as high as the top of it.

In those parts where a footpath is already made, if the surface of it is more than 9 inches above the bottom of the side channel of the road, it should be lowered to this height: if it consists of soft earth, it should be

lowered 6 inches more, so as to allow a coating of gravel to be laid on it 6 inches thick. It should be made at least 5 feet wide, and with a perfectly smooth surface, having an inclination of 2 inches towards the road.

Where there is no footpath at present, after the sod border is formed, one should be made by degrees with the road scrapings, by laying the whole of them, every time the road is scraped, behind the sod border, and forming a hard surface, as before described.

In the months of May and October in every year, the side channels, and other water-courses of the road, should be cleared out regularly from one end of every district of the road to the other; and all weeds and grass should be taken out of the surface of the side parts of the road-way. As this is a work of great importance in respect to the preservation as well as the appearance of the road, the whole of the road labourers ought to be employed upon it in the months before mentioned, till it is completed.

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## MANAGEMENT OF LABOUR.

All labour by day wages ought, as far as possible, to be discontinued. The Surveyors should make out specifications of the work, of every kind, that is to be performed in a given time. This should be let by contract, and the Surveyors should take care to see it completed, according to the specifications, before it is paid for. Attention to this rule is most essential, as in most cases, a great part of the money expended by day labour is wasted.

## DESCRIPTION OF PLATE I.

*Fig. 1.* A, B, C, represents a level, upon the horizontal bar of which are placed four gauges, *a, b, c, d*, made to move perpendicularly to the line A, C, in dove-tailed grooves cut in the horizontal bar. When any one of these is adjusted to project a proper depth below the line A, C, it may be fixed by a thumb-screw, which will retain the gauge in the desired position.

*Fig. 2.* shews a section of the horizontal bar drawn to a larger scale, as marked upon the edge of the gauge. This section is taken through the line *e, f*, of *fig. 1*. In this figure the position of the square iron bolt, or screw pin, is more plainly seen, and also the washer placed under the thumb-screw. Three of these bolts pass through the horizontal bar, *fig. 1*. exactly three inches above the line A, C; the other seen at *d* is only two inches above the same line.

*Fig. 3.* represents a plan, or bird's-eye view of one of the gauges fixed to a fragment of the horizontal bar, shewing the dove-tailed grooves more completely.

After all the large stones have been sledged, and reduced to pieces not exceeding 4 or 5 pounds, hammers, of the weight of  $1\frac{1}{2}$  and 1 pound, with round faces, as shewn in the plate, are the most useful for breaking them to the size specified in the rules; but for small, round gravel stones, a lesser size, say 10 ounces, with faces quite flat, and about five-eighths of an inch in diameter, will be found to answer best.



## DESCRIPTION OF PLATE II.

*Fig. 1.* represents the cross section of a road made on the most improved principle, on level ground, shewing the under bed or foundation for the road materials composed of a pavement of stone laid by hand on a level surface, the broadest ends down, and the interstices firmly packed with small stones: this pavement is 7 inches deep in the centre—5 inches deep at 9 feet from the centre—3 inches deep at 9 feet from the centre and to the ends: the 18 middle feet covered with a bed of the best stones, 6 inches thick, properly broken. The shoulders, or 6 feet at each side, are covered with gravel or broken stone of an inferior quality: the whole surface for 30 feet is covered with 1 inch thick of binding gravel.

The upper surface of the footpath is 9 inches above the side channel, or on a level with the centre of the road, the footpath and mounds of earth under the posts and nails, are faced with green sods, and the main drains are cut outside the fencing.

*Fig. 2.* represents the cross section of an unimproved old road; there are 60 feet between the fences, but only 20 feet have broken stone or gravel, laid on without care or judgment: the surface is uneven, the footpath too high and badly formed, the wastes poached by cattle, and partly covered with a few tufts of weeds and heaps of road drift.

*Fig. 3.* represents the cross section of the same piece of road when improved; the wastes are levelled and covered with sod, or sown with grass seeds. The

road-way is increased to 30 feet, and properly formed, and the footpath levelled and reduced to its proper shape, with pipe drains from the side channels into the main drains, which are cut outside the fences, and the hedges are lowered.

*Fig. 4.* represents a cross section of an unimproved road in a hollow, or where there has been some cutting; the wastes are uneven and dangerous, and the road-way only 20 feet wide, without drains of any kind.

*Fig. 5.* represents the same piece of road improved; the road-way is increased to 30 feet, and properly formed; the bank on one side is cut down, and a proper footpath formed; the waste on the other side, which is hollow, is filled up with the earth removed from the opposite bank, and levelled and covered with sod, or sown with hay-seeds. The old quick fence is removed, in order to let the sun and air get to the road, and a new one made behind the footpath; outside the fencing small catch-drains are formed. Rubble stone drains are also formed along, but under, the side channels, 14 inches deep and 12 inches wide, and having a draining tile enclosed in them.

THE END.

LONDON:

J. MOYSE, TOOK'S COURT, CHANCERY LANE.

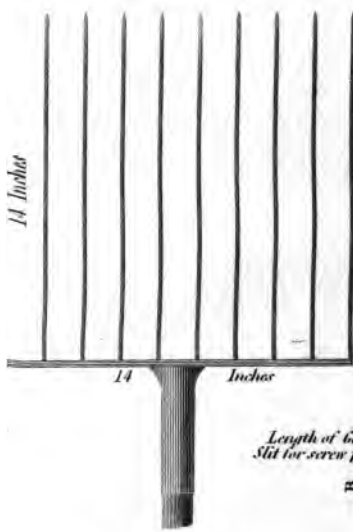




Fig. 3.



Fig. 2.



14 Inches

14 Inches



2 1/2 in.



Even 1 in.  
Length 5 in.  $\frac{1}{4}$

1 inch diameter by  $\frac{1}{4}$ . Total length 1 1/2 F.



Length 6 in.  $\frac{1}{4}$

Total length 2 1/2 F. 1 1/4 in. by  $\frac{1}{8}$ .

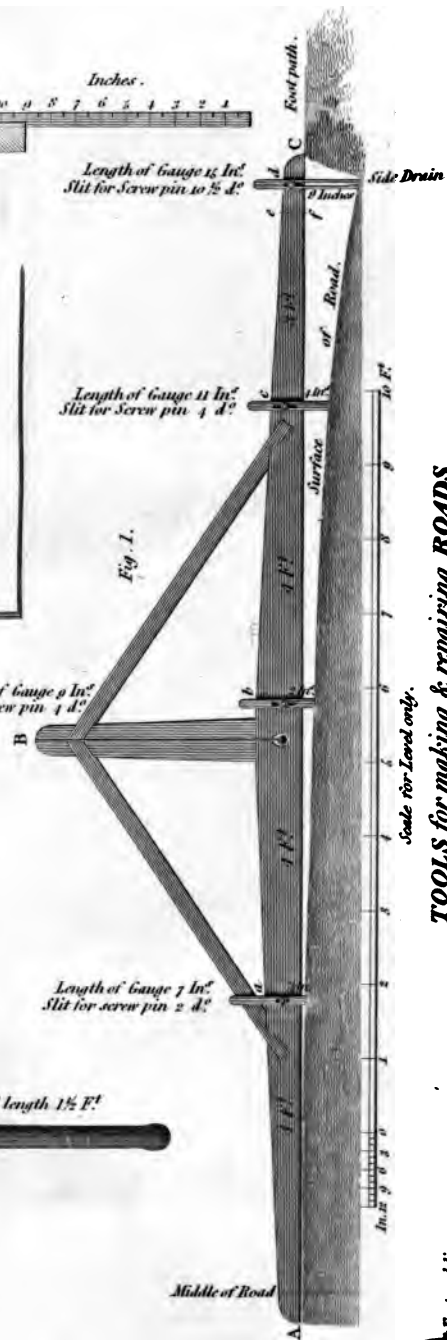
Length of Gauge 15 In.  
Slit for screw pin 10  $\frac{1}{2}$  d.

Length of Gauge 11 In.  
Slit for screw pin 4 d.

Length of Gauge 9 In.  
Slit for screw pin 4 d.

Length of Gauge 7 In.  
Slit for screw pin 2 d.

Fig. 1.



E. Burrell, engr.

TOOLS for making & repairing ROADS.

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